Convergence and summability

is such that for any choice $\varepsilon_i = \pm 1$, the series

$$\sum_{i=0}^{\infty} \varepsilon_i f_i(x) \qquad (76)$$

is B**-summable on E according to the lower measure, then (75) is absolutely convergent on E according to the lower measure. Theorem 10: If B** (T*) is some method of summation and the numerical series

$$\sum_{i=0}^{\infty} c_i \qquad (77)$$

is such that any of its partial series of the second kind has bounded B**-means (T*-means) then (77) is absolutely convergent. Theorem 11: If the numerical series

Convergence and summability

$$\sum_{i=0}^{\infty} c_i \tag{82}$$

is such that for any of its partial series of the first kind the B**-means (T*-means) have meaning and are bounded, then $c_i = A + \eta_i$, where A is a constant the the series

$$\sum_{i=0}^{\infty} \eta_i \tag{83}$$

is absolutely convergent. Theorem 12: If the numerical series

$$\sum_{i=0} c_i \tag{86}$$

is such that after any weak rearrangement of its terms the B**-means (T*-means) are bounded then $c_n = A + \eta_n$ where

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Convergence and summability

$$\sum_{n=0}^{\infty} |\eta_n| < \infty .$$

Moreover, in Theorems LL and 12: A = 0 if the nucleus of the method B** (T*) is empty or contains an infinitely distant point.
Theorem 13: There exists on the segment $[0, 1]$ a series

$$\sum_{n=0}^{\infty} f_n(x) \qquad (92)$$

for which, given any arrangement of the terms

$$\sum_{n=0}^{\infty} f_{k_n}(x),$$

the inequality

$$0 = \underline{\lim}_{N\to\infty} \sum_{n=0}^{N} f_{k_n}(x) < \overline{\lim}_{N\to\infty} \sum_{n=0}^{N} f_{k_n}(x) = 1 \qquad (93)$$

holds for all $x \in [0, 1]$ after the inclusion of a not greater than enumerable set. And for all $x \in [0, 1]$

$$-1 = \underline{\lim}_{n\to\infty} f_n(x) < \overline{\lim}_{n\to\infty} f_n(x) = +1. \qquad (94)$$

Theorem 14: If the orthogonal series

$$\sum_{i=0}^{\infty} c_i\, _i(x) \quad (x \in [0, 1]) \qquad (\blacksquare)$$

is such that any of its partial series of the second kind is B**-summable (T*-summable) on E according to the measure, then (97) is absolutely convergent on E according to the measure. Theorem 15: If series (97) is such that $\underline{\lim}_{i\to\infty} /c_i/ < \infty$ and a) any partial series

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of the first kind is B**-summable (T*-summable) according to the measure on E, (b) or (97) is weakly absolutely B**-summable (T*-summable) on E according to the measure, then (97) is absolutely convergent on E according to the measure. Theorem 16: If $\{\varphi_i(x)\}$ is a bounded in the aggregate, orthogonal normalized system on [0, 1] and (97) is weakly absolutely B*-summable (T*-summable) almost everywhere on [0, 1] then the series converges (even weakly absolutely) almost everywhere on [0, 1] and

$$\sum_{k=0}^{\infty} c_k^2 < \infty .$$

Theorem 17: If $\{\varphi_i(x)\}$ is an orthogonal normalized system such that for any $M \subset E$ and $mM > 0$

$$\lim_{k \to \infty} \int_M \varphi_k^2(x)\, dx > 0 \qquad (99)$$

and the series

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Convergence and summability

$$\sum_{k=0}^{\infty} c_k \varphi_k(x) \qquad (100)$$

is either (a) weakly absolutely B**-summable (T*-summable) on E according to the measure or (b) every partial series of the first or second kind from (100) is B**-summable (T*-summable) on E according to the measure, then the series (100) is absolutely convergent on $[0, 1]$ according to the measure and

$$\sum_{k=0}^{\infty} c_k^2 < \infty .$$

Theorem 18: If the periodic function $\varphi(x)$ is such that $\int_0^1 \varphi(x)dx = 0$ and the series

$$\sum_{n=0}^{\infty} a_n \varphi(\lambda_n x + \beta_n) \qquad (|\lambda_n| \to \infty) \qquad (101)$$

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is either (a) weakly absolutely B**-summable (T*-summable) on E according to the measure or (b) every partial series of the first or second kind is B**-summable (T*-summable) on E according to the measure, then (101) is absolutely convergent on E according to the measure. There are 18 references: 17 Soviet-bloc and 1 non-Soviet-bloc.

SUBMITTED: October 8, 1959

Card 14/14

16.4000
16(1)

68125
S/038/60/024/01/003/006

AUTHOR: Ul'yanov, P.L.

TITLE: Strongly Unconditionally Convergent Series

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya matematicheskaya, 1960, Vol 24, Nr 1, pp 75-92 (USSR)

ABSTRACT: The series

(1) $\sum_{n=1}^{\infty} f_n(x)$

is called strongly unconditionally convergent on E if, after an arbitrary change of the terms, it converges everywhere on E with a possible exception of an at most coutable set.
Theorem 1: If on a continuous set E it holds

(7) $\sum_{n=1}^{\infty} f_n^2(x) < \infty$ and $\sum_{n=1}^{\infty} |f_n(x)| = \infty$,

then there exists a series $\sum_{n=1}^{\infty} \varphi_n(x)$, $|\varphi_n(x)| = |f_n(x)|$, which

1) everywhere on E is absolutely divergent and 2) is strongly

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Strongly Unconditionally Convergent Series

unconditionally convergent on E with all subseries.
Theorem 2: If on E there holds (7) as above, then there exists a series

(8) $\sum_{n=1}^{\infty} \psi_n(x)$, $\quad |\psi_{2k-1}(x)| = |\psi_{2k}(x)| = |f_k(x)|$,

1) which on (8) strongly unconditionally converges to 0,
2) all the subseries of which converge strongly unconditionally on E, 3) where for all $x \in E$ it holds $\sum_{n=1}^{\infty} \psi_n^+(x) = +\infty$, $\sum_{n=1}^{\infty} \psi_n^-(x) = -\infty$, where

$$\psi_n^+(x) = \begin{cases} \psi_n(x) & \text{for } \psi_n(x) > 0 \\ 0 & \text{for } \psi_n(x) \leq 0 \end{cases}$$

$$\psi_n^-(x) = \begin{cases} \psi_n(x) & \text{for } \psi_n(x) \leq 0 \\ 0 & \text{for } \psi_n(x) > 0. \end{cases}$$

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Theorem 3: If (1) converges strongly unconditionally on E, then, for an arbitrary arrangement of the terms, it converges to a finite function F(x) (everywhere on E with a possible exception of an at most countable set).

Theorem 4: Let $f_n(x)$ be continuous on a complete set P. In order that (1) is strongly unconditionally convergent on P it is necessary and sufficient that (1) converges absolutely on P (with a possible exception of an at most countable set nowhere dense on P).

Theorem 5.6: Let $f_n(x)$ be measurable on E, $mE > 0$. If (1) is strongly unconditionally convergent on E, then it is absolutely convergent almost everywhere on E. If (1) is absolutely divergent on $E_1 \subset E$, $mE_1 > 0$, then the terms can be transformed so that the new series is divergent on a complete set.

Theorem 8: Let (1) be defined on $[0,1]$; let $\lim_{n\to\infty} f_n(x) = 0$ for $x \in [0,1]$, $\sum_{n=1}^{\infty} f_n^2(x) = \infty$ for $x \in [0,1]$. Then there exist $\psi_n(x)$

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so that $|\psi_n(x)| = 1$ and that for an arbitrary arrangement of the terms, the series $\sum_{n=1}^{\infty} \psi_n(x) f_n(x)$ diverges everywhere on $[0,1]$ (with a possible exception of at most countably many points), where for all $x \in [0,1]$ it holds:

$$\sum_{n=1}^{\infty} [\psi_n(x) f_n(x)]^+ = -\sum_{n=1}^{\infty} [\psi_n(x) f_n(x)]^- = +\infty .$$

The author mentions Aleksandrov, Yegorov, Lusin, and N.A. Davydov.

There are 15 references, 11 of which are Soviet, 1 English, 1 Polish, 1 German, and 1 American.

PRESENTED: by A.N.Kolmogorov, Academician

SUBMITTED: October 24, 1958

Card 4/4

BARI, Nina Karlovna; UL'YANOV, P.L., red.; RYVKIN, A.Z., red.; BRUDNO, K.F., tekhn.red.

[Trigonometric series] Trigonometricheskie riady. Pri red. uchastii P.L.Ul'ianova. Moskva, Gos.izd-vo fiziko-matem.lit-ry, 1961. 936 p. (MIRA 14:5)

(Fourier's series)

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C111/C222

16.4200

AUTHOR: Ul'yanov, P.L.

TITLE: On local properties of convergent Fourier series

PERIODICAL: Referativnyy zhurnal, Matematika, no. 7, 1961, 7, abstract 7 B 30 ("Uch. zap. MGU", 1959, vyp 186, 71-82

TEXT: Let $f(x) \in L(0, 2\pi)$, and let

$$a_0/2 + \sum_{k=1}^{\infty} (a_k \cos kx + b_k \sin kx) \qquad (1)$$

be the Fourier series of $f(x)$. Let $S_n(x)$ be the partial sums of (1). Let

$$\Delta^m [f(x), t] = \sum_{k=0}^{m} (-1)^k \binom{m}{k} f(x + (m - 2k)t) .$$

The author proves the following theorems for an even m :
1. If for $\alpha > 0$ it holds

$$|f(x_0) - S_n(x_0)| = o(n^{-\alpha}) \qquad (2)$$

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On local properties of convergent ...

then for $m > \alpha$ it holds

$$\int_0^u \Delta^{(m)} [f(x_0), t]\, dt = o(u^{1+\alpha}) \quad ; \qquad (3)$$

(for $m = 2$, $0 < \alpha < 1$, that was proved by Idzumi, Matsuyama and Tsutikura).

It is pointed out that here $o(u^{1+\alpha})$ cannot be replaced by $o\{\varphi(u)u^{1+\alpha}\}$, where $\varphi(u) \to 0$.

2. If (2) is satisfied for an integral even α then for $m = \alpha$ it holds (3), where the right hand side is replaced by $o(u^{1+\alpha} \ln \frac{1}{u})$. It is pointed out that here the right hand side of (3) cannot be replaced by $o\{\varphi(u) \cdot u^{1+\alpha} \ln \frac{1}{u}\}$, where $\varphi(u) \to 0$.

3. If (2) is satisfied then it holds (3) for $m < \alpha$, where the right hand side is replaced by $O(u^{m+1})$, and O cannot be replaced by o.

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On local properties of convergent ...

4. If for $\eta > 0$ it holds

$$|f(x_0) - S_n(x_0)| = O(1/\ln^{1+\eta} n) ,$$

then it holds (3), where the right hand side is replaced by $o(u)$. Idsumi has shown that this result is incorrect for $m = 2$ and $\eta = 0$.

5. Let $\omega(x) \uparrow \infty$ for $x \to \infty$, $\omega(x) = O(x^2)$, $\frac{1}{N^2} \sum_{k=1}^{N} k/\omega(x) =$ $= O\left(\sum_{k=N+1}^{\infty} 1/k\omega(k)\right) = O\left(\int_{N+1}^{\infty} dx/x\omega(x)\right)$. If $|f(x_0) - S_n(x_0)| =$ $= O\left(1/\omega(n)\right)$, then for $m = 2$ it holds (3), where the right hand side is replaced by $O\left(u \int_{1/u}^{\infty} dx/x\omega(x)\right)$. For an odd m there hold theorems being analogous to 1 - 4 if the condition (2) is replaced by the corresponding condition for the partial sums of the conjugate series.

[Abstracter's note: Complete translation.]

Card 3/3

UL'YANOV, P.L.

Integrals of the Cauchy type. Trudy Mat. inst. no.60:262-281 '61. (MIRA 14:10)

(Integrals)

LYUSTERNIK, L.A.; MEN'SHOV, D.Ye.; NAYMARK, M.A.; UL'YANOV, P.L.

Abram Iezekiilovich Plesner; on his 60th birthday. Usp. mat. nauk 16 no.1:213-218 Ja-F '61. (MIRA 14:6)
(Plesner, Abram Iezekiilovich, 1900—)

UL'YANOV, P.L.

Cauchy type integrals; convergence and summability. Usp. mat. nauk 16 no.2:255-260 Mr-Ap '61. (MIRA 14:5)
(Functional analysis) (Series)

UL'YANOV, P.L.

"Problem of the convergence of orthogonal series by G. Alexits. Reviewed by P.L.Ulianov. Usp. mat. nauk 16 no.2:261-264 Mr-Ap '61. (MIRA 14:5)

(Series, Orthogonal) (Alexits, G.)

24172
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16.4200

AUTHOR: Ulyanov, P. L.

TITLE: Divergent Fourier series

PERIODICAL: Uspekhi matematicheskikh nauk, v.16, no. 3, 1961,61-142

TEXT: Contents: §1. Introduction. §2. Definitions and lemmata. §3. Theorems from the theory of series summation. §4. Construction of Zahorski. §5. Series in terms of the Haar system. §6. Series in terms of bases. §7. Trigonometric series. §8. Series in terms of the Walsh system. §9. Series in terms of orthogonal normed complete systems. §10. Weakly unconditional convergent series. §11. On some problems. Bibliography.

The paper is a connected representation of the theory of divergent Fourier series, above all representing the new results of Zahorski (Ref. 16: Une série de Fourier permutée d'une fonction de classe L^2 divergente presque partout, Compt. Rend. Acad. Sci. (Paris) 251 (1960), 501-503. [A Fourier series of a function of class L^2, diverging almost everywhere]) and of the author e. g. (Ref. 17: O bezuslovnoy skhodimosti i summiruyemosh, [On unconditional convergence and summability] Szv. AN, seriqa matem. 22 (1958), 811-840; Ref. 18: Raskhodyashchieyes-

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Divergent Fourier series.

ya ryady Fur'ye klassa L^p $(p \geq 2)$ [Divergent Fourier series of the class L^p $(p \geq 2)$] DAN 137, no. 4 (1961), 786-789; Ref. 20: Raskhodyashchiyesya ryady po sisteme khaara i po bazisam [Divergent series in terms of the system of Haar and of bases] DAN 138, no. 3 (1961)), besides of the older results of Orliez, Paley, Zygmund, Men'shov, Kolmogerov.

§1 contains an historical survey of the development of the theory of divergent series.

§2 contains a number of well-known older results, given without proof and used for proving the following theorems.

§3 contains newer results of the author on the summation of series, besides of a few older well-known results. Let $\gamma^* = \| b_{n,m} \|$ be a linear method of summation, with the property

$$\lim_{n \to \infty} b_{n,m} = 1 \qquad (3.7)$$

for every $m=0,1,\ldots$ Assume that the series (2.1) $\sum_{n=1}^{\infty} f_n$ decomposes into a finite number of partial series,

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$$\sum_{k=1}^{\infty} f_{n_k(p)} \qquad (p=0,1,\ldots,M). \tag{2.3}$$

where $n_1^{(p)} < n_2^{(p)} < \ldots$ Every series

$$\sum_{j=1}^{\infty} f_{m_j} \tag{2.4}$$

is called a weakly transposed series of (2.1), if originating of the partial series $\sum_{k=1}^{\infty} f_{n_k}^{(0)}$ by "attenuation" of it by the terms of the series (2.3) for $p=1,2,\ldots,M$ such that in (2.4) the sequence of the terms of the particular partial series (2.3) is maintained.

Theorem 3.4: Let $f_i(x)$, measurable and finite (almost everywhere on E, $mE > 0$) functions, holding for a sequence $p_i \uparrow \infty$

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$$\lim_{i\to\infty} f_{p_i}(x) = 0 \text{ for } x \in E. \tag{3.14}$$

Then if the series

$$\sum_{i=0}^{\infty} f_i(x) \tag{3.15}$$

diverges in every point $x \in E$, it is possible to transpose weakly for every method of summation $\gamma^* = \| b_{n,m} \|$ the terms of (3.15) so that the originated series

$$\sum_{i=0}^{\infty} f_{q_i}(x) \tag{3.16}$$

is not summable by the method γ^*, in almost every point $x \in E$.

In §4 the construction of a trigonometric Fourier series of the class L^2 is described, diverging almost everywhere in $[0, 2\pi]$ after a certain transposition of the terms. This construction, mentioned by Zahorski [16], is modified such that it is applicable in an

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orthogonal normed Haar system.
§5 , the longest paragraph, contains the most important results of the paper(compare with (Ref. 18)).
Linear methods of summation, satisfying the conditions:

1.) $\lim_{i\to\infty} a_{in}=0$ for every fixed n 3 0,1,...

2.) $\lim_{i\to\infty} \sum_{n=0}^{\infty} a_{in}= 1$

are termed by $T^* = \| a_{n,m} \|$.

Theorem 5.2: For all $p < 0$ there exists an $F(x) \in L^p(0,1)$ such that for every method of summation $\gamma^* = \| b_{n,m} \|$ (method $T^* = \| a_{n,m} \|$) a certain transposed Fourier series of the function F(x) in terms of the Haar system $\{\chi_n^{(k)}(x)\}$ is not summable by the method γ^* (method T*) in almost every point $x \in [0,1]$. Further on: the T* - averages of certain transposed Fourier series of F(x) are not bounded almost everywhere on

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$[0,1]$. The same holds the γ^* - methods with $\lim_{m\to\infty} b_{n,m} = 0 (n = 1,2,\ldots)$.

Theorem 5.3: Let $w(n)\uparrow\infty$ be a sequence of numbers such that $w(n) = o(\log n)$ for $n = \infty$. Then there exists an $f(x) \in L^2(0,1)$ such that its Fourier series

$$\sum_{m=1}^{\infty} a_m \chi_m(x) \qquad \left(a_m = \int_0^1 f(t)\chi_m(t)\,dt\right),$$

after a certain transposition of the terms,

$$\sum_{\gamma=1}^{\infty} a_{p_\gamma} \chi_{p_\gamma}(x),$$

diverges boundedly for aomost all $x \in [0,1]$ and in spite of all:

$$\sum_{m=1}^{\infty} a_m^2 \, w(m) < \infty, \sum_{\gamma=1}^{\infty} a_{p_\gamma}^2 \, w(\gamma) < \infty.$$

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Conclusion: There are orthogonal series of the class L^2, boundedly diverging almost everywhere on $[0,1]$.

Theorem 5.6: For every transposed Haar system $\{\chi_m(x)\}$ the sequence $(\log n)^{1+\varepsilon}$ with an arbitrary $\varepsilon > 0$ is a Weyl - convergence factor. (Every appearing logarithm has the base 2).

Theorem 5.7: If the a_m satisfies

$$\sum_{m=1}^{\infty} \frac{|a_m|}{\sqrt{m}} < \infty, \tag{5.49}$$

Then:

$$\sum_{m=1}^{\infty} |a_m \chi_m(t)| \tag{5.50}$$

is convergent almost everywhere on $[0,1]$. The converse: if $|a_m| \downarrow 0$, and (5.50) converges at least in one point t_0, then (5.49) holds.

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Divergent Fourier series.

Theorem 5. 8: For $\alpha > 1$ (and not for $\alpha < 1$) the sequence $(\log n)^{\alpha}$ is a Weyl-factor for unconditional convergence almost everywhere for the series in terms of the Haar system $\{\chi_m(x)\}$.

In §6 there is proved by aid of the results of §5 that there are no bases in $L^2(0,1)$ such that the series expansion with respect to them is unconditional convergent almost everywhere.

In §7 out of these general properties one obtains the old result of Kolmogorov and Men'shov that there exists a 2π-periodic $f(x) \in L^2(0,2\pi)$, the Fourier series of which can be transposed such that it is unboundedly divergent for almost all $x \in [0,2\pi]$.
Further on:
Theorem 7.2: There exists an $F(x) \in L^p(0,2\pi)$, $p > 0$, such that for every γ^* or T^* - method the Fourier series

$$F(x) \sim \sum_{k=1}^{\infty} (c_k \cos kx + d_k \sin kx) \qquad (7.1)$$

of $F(x)$ can be transposed such that the new series

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$$\sum_{i=1}^{\infty} (c_{m_i} \cos m_i x + d_{m_i} \sin m_i x) \qquad (7.2)$$

is not summable for almost all $x \in [0,2\pi]$ γ^* - or T^*.

One is able even to give a series (7.2) such that its T^*-averages are not bounded for almost all $x \in [0,2\pi]$. The same holds for γ^*-methods, with $\lim_{m\to\infty} b_{n,m} = 0$ $(n = 1,2,\ldots)$. There follows quite a number of partly well-known similar results, e.g.

Theorem 7.4: If $f(x) \in L^2(0,2\pi)$ has the property that for $\varepsilon > 0$:

$$\sum_{n=3}^{\infty} \frac{(\log\log n)^{1+\varepsilon} \log n}{n} \left\{E_n^{(2)}(f)\right\}^2$$

then the Fourier series of $f(x)$ converges unconditional almost everywhere on $[0,2\pi]$; here $E_n^{(2)}(f)$ is the best approximation in the metric

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of L^2 by trigonometric polynomials of degree $\leq (n-1)$.

In §8 results, anlogical to those of §7, referring to an expansion in terms of the Walsh system, are proved.

In §9 it is mainly shown that there is no orthogonal normed complete system, having only unconditional convergent series expansions.

§10 The series $\sum_{n=1}^{\infty} f_n(x)$

is called weakly unconditional convergent on E, if converging almost everywhere on E under every weak transposition of the terms.
Theorem 10.1: The sequence $\{\log^2 n\}$ is a Weyl factor for weak unconditional convergence almost everywhere for arbitrary orthogonal series.
Theorem 10.3: The orthogonal normed complete Haar system $\{\chi_m(t)\}$ is a system of weak unconditional convergence almost everywhere and is no system of unconditional convergence almost everywhere.
Theorem 10.7: Let the system $\{\varphi_n(x)\}$, orthogonal normed on $[0,1]$ be complete or bounded.
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If

$$\sum_{n=1}^{\infty} c_n \varphi_n(x) \qquad (10.7)$$

is weakly unconditional convergent almost everywhere on E, $mE > 0$, (or on $[0,1]$), then

$$\lim_{n\to\infty} |c_n| = 0 \qquad (10.8)$$

or

$$\left(\sum_{n=1}^{\infty} c_n^2 < \infty \right). \qquad (10.9)$$

In §11 a number of unsolved problems is formulated, e.g.

8.) Let $f(x) \in L^p(0, 2\pi)$, $1 \leq p < 2$; and let the trigonometric Fourier series of $f(x)$ converge on E, $mE > 0$, after a certain transposition of the terms to the function $\varphi(x)$. Is $f(x) = \varphi(x)$ for all $x \in E$?

The author mentions: N.N. Luzin, A.N. Kolmogorov, S.B. Stechkin, D.Ye. Men'shov, A.A. Talalyan, A.M. Olevskiy, R.Kuk, N.K. Bari. There is 1 figure, 25 Soviet-bloc and 23 non-Soviet-bloc references.

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Divergent Fourier series.

The four references to English-language publications read as follows: R.E.A.C. Paley, A. Zygmund, On some series of functions, Proc. Cambridge Phil. soc. 26 (1930), 337-357; G. Hardy, Raskhodvashchiyesya ryady, M. IL., (1951) [Divergent series]; Z. Ciesielski, J. Musielak, On absolute convergence of Haar series, Colloq. math. 7, no. 1 (1959) 61-65; Chen Kien-kwong, On the series of orthogonal polynomials, Sci. Rec. 1, no. 2 ('1957), 13-18.

SUBMITTED: January 24, 1961

Card 12/12

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14.4200

AUTHOR: Ul'yanov, P.L.

TITLE: Divergent series of Fourier in the class L^p $(p \geqslant 2)$

PERIODICAL: Akademiya nauk SSSR. Doklady, vol.137, no.4, 1961, 786-789

TEXT: Basing on own older publications and on the construction of Zahorski (Ref.14: C.R., 251, 501, 1960) at first the author formulates the new theorems:
Theorem 2: For all $p > 0$ there exists a function $F(x) \in L^p(0,1)$ with the property that for every method of summation T^* the Fourier series of the function $F(x)$ with respect to the system $\{\omega_n(x)\}$ of Walsh (Uolsh) after a certain rearrangement of the terms is no longer T^*-summable almost everywhere on $[0,1]$.
Theorem 3: There exists an $F(x) \in L^2(0,1)$ so that for every T^*-method a certain rearranged Fourier series of $F(x)$ with respect to the system $\{\chi_n^{(k)}(x)\}$ of Haar is no longer T^*-summable almost everywhere on $[0,1]$.
Then the following definitions are introduced and the following further theorems are formulated:
Definition 1: A series of functions is called weakly unconditionally

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convergent almost everywhere on E if for an arbitrary weak rearrangement of the terms it converges everywhere on E.
(A series of natural numbers is weakly rearranged if it decomposes into a finite number of increasing sequences).
Definition 2: Let $\{\varphi_k(x)\}$ be an orthogonally normed system on $[0,1]$. The system $\{\varphi_k(x)\}$ is called a system of convergence if every series

$$\sum c_k \varphi_k(x) \quad \text{with} \quad \sum c_k^2 < \infty \tag{5}$$

converges almost everywhere on $[0,1]$.
Definition 3: A system $\{\varphi_k\}$ is called a system of unconditional convergence (weakly unconditional convergence) if every series (5) converges unconditionally (weakly unconditionally) almost everywhere on $[0,1]$.
Theorem 4: There exists an orthogonally normed complete system being a system of convergence (system of weak unconditional convergence) and no system of unconditional convergence.
Theorem 5: There exists a series of functions

Divergent series of Fourier...

$$\sum_{n=1}^{\infty} f_n(x) \qquad (x \in [0,1],\ f_n(x) \text{ measurable}) \qquad (6)$$

each partial series $\sum_{k=1}^{\infty} f_{n_k}(x)$ $(n_1 < n_2 < \dots)$ of which converges almost everywhere on $[0,1]$, while the series (6) itself after a certain rearrangement of the terms diverges on $[0,1]$.

Theorem 6: There exists an orthogonal series

$$\sum_{k=1}^{\infty} a_k \varphi_k(x) \quad \text{with} \quad \sum_{k=1}^{\infty} a_k^2 < \infty \quad (|\varphi_k(x)| \leq C,\ C=\text{const}) \qquad (8)$$

converging everywhere on $[0,1]$ although it is not weakly unconditionally convergent. After a certain weak rearrangement, (8) diverges almost everywhere on $[0,1]$.

Theorem 7: If the series

$$\sum_{k=1}^{\infty} c_k \varphi_k(x), \qquad (1)$$

where $\{\varphi_k\}$ is a complete orthogonally normed system (or bounded

orthogonally normed system), converges weakly unconditionally almost everywhere on the set E, $mE > 0$ and on $[0,1]$, respectively, then

$$\lim_{k\to\infty} |c_k| = 0 \qquad \left(\sum_{k=1}^{\infty} c_k^2 < \infty \text{ , resp.} \right). \tag{9}$$

Theorem 8: If there exists a function $f(x)$ continuous on $[0,2\pi]$ (or $f \in L^p$ for a certain $p > 1$) the Fourier series of which deverges on a set of positive measure then there exists a continuous function $F(x)$ ($F \in L^p$ resp.) the Fourier series of which deverges unboundedly everywhere on $(-\infty, \infty)$.

The author mentions A.N.Kolmogorov, D.Ye.Men'shov and N.N.Luzin. There are 9 Soviet-bloc and 6 non-Soviet-bloc references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova (Moscow State University im. M.V.Lomonosov)

PRESENTED: October 28, 1960, by P.S.Aleksandrov, Academician

SUBMITTED: October 25, 1960

UL'YANOV, P.L.

Divergent series under Haar's system and on bases. Dokl.AN SSSR 138 no.3:556-559 My '61. (MIRA 14:5)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova. Predstavleno akademikom P.S.Novikovym.
(Series, Divergent)

UL'YANOV, P.L.

Exact Weil's factors for unconditional convergence. Dokl. AN SSSR 141 no.5:1048-1049 D '61. (MIRA 14:12)

1. Predstavleno akademikom A.N. Kolmogorovym.
(Convergence)
(Sequences (Mathematics))

MEN'SHOV, D.Ye.; UL'YANOV, P.L.

In memory of professor N. K. Bari. Vest. Mosk. un. Ser. 1: Mat., mekh. 17 no.1:74-80 Ja-F '62. (MIRA 15:1)
(Bari, Nina Karlovna, 1901-1961)

ALEKSANDROV, P.S.; UL'YANOV, P.L.

Dmitrii Evgen'evich Men'shov; on his 70th birthday. Usp.mat.nauk 17 no.5:161-175 S-O '62. (MIRA 15:12)
(Men'shov, Dmitrii Evgen'evich, 1892-)

STECHKIN, S.B.; UL'YANOV, P.L.

Uniqueness sets. Izv.AN SSSR.Ser.mat. 26 no.2:211-222 Mr-Ap '62. (MIRA 15:7)

1. Matematicheskiy institut imeni V.A.Steklova AN SSSR i Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Aggregates) (Series)

GUTER, R.S.; KUDRYAVTSEV, L.D.; LEVITAN, B.M.; UL'YANOV, P.L., red.; LYUSTERNIK, L.A., red.; YANPOL'SKIY, A.R., red.; GAPOSHKIN, V.F., red.; KOPYLOVA, A.N., red.; PLAKSHE, L.Yu., tekhn. red.

[Elements of the theory of functions; functions of real variables, approximation of functions; almost periodic functions] Elementy teorii funktsii; funktsii deistvitel'nogo peremennogo, priblizhenie funktsii, pochti-periodicheskie funktsii. Moskva, Fizmatgiz, 1963. 244 p. (MIRA 16:12)

(Functions)

ROZOV, N.Kh.; UL'YANOV, P.L., prof.

Examination in mathematics. Nauka i zhizn' 30 no.5:47-49 My '63.
(MIRA 16:10)

1. Starshiy ekzamenator mekhaniko-matematicheskogo fakul'teta Moskovskogo gosudarstvennogo universiteta (for Rozov).

ROZOV, N, Kh.; UL'YANOV, P.L., konsul'tant-prof.

Test yourself. Nauka i zhizn' 30 no.6:52-54 Je '63.
(MIRA 16:7)

1. Starshiy ekzamenator mekhaniko-matematicheskogo fakul'teta Moskovskogo gosudarstvennogo universiteta (for Rozov).
2. Moskovskiy gosudarstvennyy universitet (for Ul'yanov).
(Mathematics—Problems, Exercises, etc.)

UL'YANOV, P.L. (Moskva)

On Weyl factors for unconditional convergence. Mat. sbor. 60 no.1:39-62 Ja '63. (MIRA 16:2)
(Fourier series)
(Convergence)

UL'YANOV, P.L.

Series in Haar's system. Dokl.AN SSSR 149 no.3:532-534 Mr '63.
(MIRA 16:4)

1. Predstavleno akademikom P.S.Novikovym.
(Series)

ACCESSION NR: AP4029381 S/0199/64/005/002/0418/0437

AUTHOR: Ul'yanov, P. L.

TITLE: On the approximation of functions

SOURCE: Sibirskiy matematicheskiy zhurnal, v. 5, no. 2, 1964, 418-437

TOPIC TAGS: real variable, approximation, Fourier series, summability, numerical approximation, Caesaro summability, divergent series

ABSTRACT: The present work considers real-valued functions of a real variable f(x) defined on [o, 2π] and extended by means of periodicity. The functions are further required to lie in $L^p(o, 2\pi)$ for $1 \leq p < \infty$. Various theorems are proven concerning the approximation of a function in the class considered by means of the Caesaro means of the sequence of partial sums of its Fourier series. If $\sigma_n^{\alpha}(x, f)$ denotes the n^{th} Caesaro mean of order α of the Fourier series for f(x), then it is shown that if f(x) satisfies a Lipshitz condition of order $\beta < 1$, then

$$\sup_{0 < x < 2} \left| \sigma_n^{\alpha}(x, f) - f(x) \right| = O\left(\frac{1}{n^{\beta}}\right)$$

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ACCESSION NR: AP4029381

for $0 < \beta < \alpha \leq 1$, and it is shown that for a given $f(x)$ satisfying a Lipshitz condition of order β, a sequence of approximants $\sigma_n^{\alpha}(x, f)$ to $f(x)$ can be constructed for any choice of $0 < \alpha \leq 1$. A similar proof of a result due to Stechkin is presented, and various methods of summation, other than Caesaro summation, are discussed. Orig. art. has: 53 formulas.

ASSOCIATION: None

SUBMITTED: 02Oct62

DATE ACQ: 28Apr64

ENCL: 00

SUB CODE: MM

NO REF SOV: 011

OTHER: 005

Card 2/2

UL'YANOV, P.L.

Solved and unsolved problems in the theory of trigonometric and orthogonal series. Usp.mat.nauk 19 no. 1:3-69 Ja-F '64. (MIRA 17:6)

UL'YANOV, P.L.

Haar's series with monotone coefficients. Izv. AN SSSR. Ser. mat. 28 no. 4:925-950 Jl-Ag '64. (MIRA 17:9)

UL'YANOV, P.L. (Moskva)

Haar's system of orthogonal series. Mat. sbor. 63 no.3:356-391 Mr '64. (MIRA 17:4)

UL'YANOV, P.V., kandidat veterinarnykh nauk; CHISTYAKOV, F.A., veterinarnyy vrach; ZHINKIN, P.V., veterinarnyy vrach; CHAYANOV, Yu.A., student.

Course of babesiosis in cattle in districts infested by the tick Ixodes persulcatus. Veterinariia 32 no.4:45-47 Ap '55. (MLRA 8:5)

1.Ivanovskaya oblastnaya vetbaklaboratoriya.
(DOMESTIC ANIMALS--PARASITES) (TICKS AS CARRIERS OF DISEASE)

UL'YANOV, P. V.

Category: USSR / Farm Animal Diseases Caused by Helminths. V-3

Abs Jour: Refer. Zhur-Biologiya, No 16, 1957, 72315

Author : Ul'yanov P. V., Ivanova P. S.
Inst : Not given
Title : Protostrongylinosis in Sheep in the Ivanovsk Region.

Orig Pub: Sb. Nauchn. Tr. Ivanovsk. S. Kh. In-ta, 1956, Vyp. 13, 161-163

Abstract: No abstract.

Card : 1/1 -4-

USSR/Diseases of Farm Animals - Diseases Caused by Helminths. R.
Arachno-Entoms.

Abs Jour : Ref Zhur - Biol., No 6, 1958, 26343

Author : Ul'yanov, P.V., Marsov, A.A., Ovchinnikov, M.S.

Inst : Ivanovskiy Farm Institute.

Title : To the Problem of the Enzootic Course of Chorintosis in Horses.

Orig Pub : Sb. nauchn. tr. Ivanovsk. s.-kh. in-ta, 1956, vyp. 15, 433-437

Abstract : In one of the rayons of the Ivanovskiy oblast' a mass propagation of chorintosis in horses was observed. For their treatment a two percent solution of DDT in solar oil [crude petroleum], a three percent emulsion of creolin and TIM soap, as well as treatment in a gas

Card 1/2

USSR/Diseases of Farm Animals - Diseases Caused by Helminths. R.
Arachno-Entoms.

Abs Jour : Ref Zhur - Biol., No 6, 1958, 26343

chamber with sulphuric gases were used.
Two to three short applications of these remedies led
to a full recovery of the animals.

Card 2/2

UL'YANOV, P.V., dotsent

Seasonal dynamics of dictyocaulesis in sheep in Ivanovo Province. Sbor.nauch.trud. Ivan.sel'khoz.inst. no.16:227-234 '58. (MIRA 13:11)

(Ivanovo Province--Sheep--Diseases and pests)

UL'YANOV, P.V., dotsent; IVANOVA, P.S., prof.

Data on the development of Dictiocaulus filaria prior to the infestation of sheep. Sbor.nauch.trud. Ivan.zel'khoz.inst. no.16:235-241 '58. (MIRA 13:11)

1. Kafedra akusherstva i zoogigiyeny Ivanovskogo sel'skokhozyaystvennogo instituta (for Ul'yanov).
(Sheep--Diseases and pests)

UL'YANOV, R. (Engr-Lt. Col.) and KUVARZIN, I. (Engr-Lt Col.)

"Study of the Construction and Characteristics of Thermostable Construction and Heat-Insulating Materials," report presented at the Ninth Scientific-Technical Conference, held at the Khar'kov Higher Aviation-Engineering Military School, Dec 1958.

21224

18.3000 1067, 1208, 1454

S/126/61/011/003/012/017
E021/E435

AUTHORS: Ul'yanov, R.A., Nechiporenko, Ye.P. and Tarasov, N.D.

TITLE: Vacuum Refining of Niobium

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.3, pp.461-464

TEXT: Results on refining experiments, the preparation of compact metal and data on the structure and mechanical properties are given. Commercially-pure niobium powder (98.7% containing 0.08% iron, 0.2% lead, 0.04% silicon and 0.18% carbon) was used. The powder also contained moisture, oxygen, nitrogen and hydrogen. Hydrogen and hydrides were removed by heating in vacuo to 700°C. Oxygen and oxides were removed at 1900 to 2000°C. The powder was dried to constant weight and pressed at 5 to 6 t/cm^2. Sintering was carried out in vacuo at 1400°C for 4 to 6 hours. Fig.1 shows samples after this treatment. Further refining is carried out by a high temperature treatment (2300 to 2500°C) in a vacuum of 10^{-5} mm mercury for eight hours, in a special water cooled chamber. The samples are placed between tungsten electrodes and heated by passing a current. The appearance of the samples after treatment is shown in Fig.2. The purity was followed by spectrographic

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analysis; the results show how the lines corresponding to lead, silicon and iron disappear after refining. The refined metal is subjected to arc melting in an atmosphere of carefully purified argon. The ingots after melting are silver white in colour without any trace of oxidation and they have a hardness of 80 to 100 kg/mm^2. The metal can be vacuum rolled at 1100 to 1200°C; the structure of the metal is shown in Fig.4 (a - as cast; б - hot rolled in vacuo at 1250°C; в - annealed at 1700°C for 10 hours). After annealing at 1700 to 1730°C in vacuo, the hardness is 80 to 90 kg/mm^2 (Brinell) and the tensile strength 30 to 40 kg/mm^2 with elongation of 30%. There are 4 figures, 1 table and 9 references: 3 Soviet and 6 non-Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR g. Khar'kov
(Physicotechnical Institute AS UkrSSR, Khar'kov)

SUBMITTED: August 2, 1960

S/126/61/011/003/012/017
E021/E435

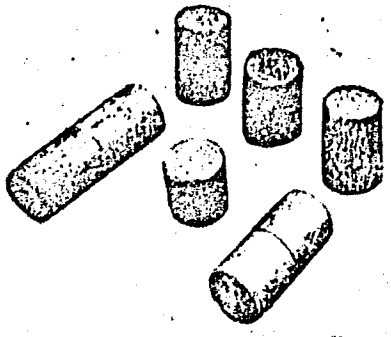

Fig.1.

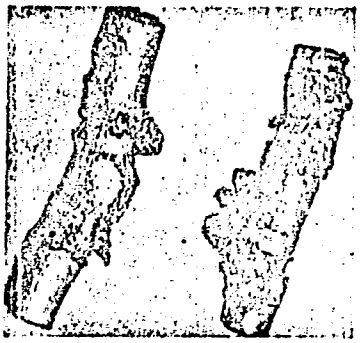

Fig.2.

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Vacuum Refining ...

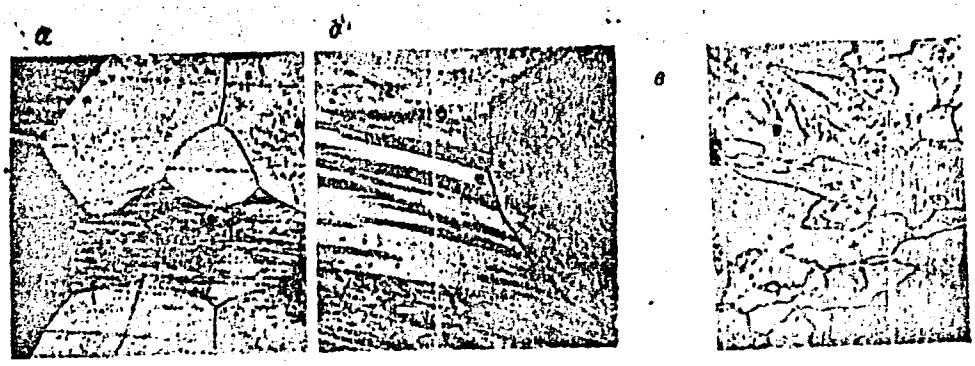

Fig.4.

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IVANOV, V.Ye.; KOVTUN, S.F.; TARASOV, N.D.; UL'YANOV, R.A.

Vacuum rolling of chemically active metals. TSvet. met. 35 no.11:85-88 N '62. (MIRA 15:11)
(Vacuum metallurgy) (Rolling (Metalwork))

UL'YANOV, R.A.; TARASOV, N.D.; KOVTUN, S.F.

Vacuum cladding of high-melting metals. TSvet. met. 36 no.3: 74-76 Mr '63. (MIRA 16:5)

(Metal cladding)

ACCESSION NR: AP4029536 S/0149/64/000/002/0140/0145

AUTHOR: Ul'yanov, R. A.; Tarasov, N. D.

TITLE: Investigation of some physical properties of solid solutions in niobium-rhenium and molybdenum-rhenium systems

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 2, 1964, 140-145

TOPIC TAGS: niobium, rhenium, molybdenum solid solution, high temperature technology, high temperature alloy, niobium base alloy, molybdenum base alloy, rhenium containing alloy, deformability

ABSTRACT: The study of the effect of alloying on properties which indirectly characterize the magnitude of the interatomic reaction forces of solid solution based on molybdenum and niobium may be useful in the development of complex alloys. The authors investigated the thermal expansion, the modulus of elasticity and its temperature dependence, as well as the mechanical properties at room and high temperatures. This investigation was conducted in solid solutions of Nb-Re and Mo-Re systems. The effect of the alloy compositions on their mechanical properties and high temperatures are presented in graphs, along with the dependences of linear expansion and moduli of elasticity. It is found that alloying molybdenum and niobium

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ACCESSION NR: AP4029536

with rhenium causes an increase in the modulus of elasticity and the characteristic temperature at room temperature, as well as at high temperature. The higher the rhenium concentration, the more these values increase. It is also found that alloying molybdenum and niobium with rhenium causes an increase in the strength of the alloys at high temperatures. The strength of the interatomic bond does not completely determine the heat resistance of the alloys based on molybdenum and niobium, nor those based on any other metals. For this to occur, factors must be realized which inhibit the development of plastic deformation attained in complex alloying. Orig. art. has: 5 figures.

ASSOCIATION: Khar'kovskoye voyennoye uchilishche (Kharkov Military College)

SUBMITTED: 24Apr63 DATE ACQ: 30Apr64 ENCL: 00

SUB CODE: ML NO REF SOV: 015 OTHER: 010

Card 2/2

ACCESSION NR: AP4028...

AUTHOR: Ul'yanov, R. A.; Tarasov, N. D.

TITLE: The oxidation of Nb and its alloys during alloying

SOURCE: Tsvetny*ye metally*, no. 4, 1964, 70-72

TOPIC TAGS: metal alloying, nonferrous alloy, alloy, niobium, niobium oxidation, niobium alloying oxidation, niobium alloy, NbO, Nb La alloy, binary niobium alloy, high temperature alloy, corrosion resistant alloy

ABSTRACT: This is a survey of some papers which studied the oxidation of Nb and its alloys during alloying. [illegible] corrosion resistance of Nb alloys at high temperature is due to the large difference between the molecular volume of niobium pentoxide and the atomic volume of the metal. Their volume [illegible] thermal stresses which oxi-

the oxide film [illegible]

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ACCESSION NR: AP4029707

inner layer of the clinker together with the oriented Nb_2O_5. The Nb_2O_5 polymorphism exhibits a pronounced effect on oxidation rate. At about 900C the

ser fiz 1956 vol 20 no 7 Splavy* redkikh metallov (Rare earth metal alloys) Metallurgizdat, 1960] established using an Al and Ti alloys sample that an addition of elements which are more active chemically than the base alloy brings about an enhancement of the oxide layer protective properties. Slavinskiy

(Physical Chemistry) II , 1962) found that elements with a smaller value for the

with small additions. In high Zr concentration when the protective properties of the oxide film are determined by the properties of the forming ZrO_2 the Zr

binary as well as more complex alloys. It is also a characteristic feature that

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the elements which reduce the Nb oxidation rate, as a rule also lower the diffu-

SUBMITTED: 00 ENCL: 00

ACCESSION NR: AP4037069 B/0129/64/000/005/0055/0056

AUTHOR: Kovtun, S. F.; Ul'yanov, R. A.; Tarasov, N. D.

TITLE: Metal cladding under vacuum

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1964, 55-56

TOPIC TAGS: vacuum cladding, chemically active metal, iron clad steel, copper brass, pure iron, electrolytic Ni, brass, cohesion strength, shear test, diffusion welding, intermetallic layer, interdiffusion

ABSTRACT: The vacuum cladding of chemically active metals is highly promising and was developed by the authors. Iron-clad "Kh18N9T" steel, copper-brass, commercially pure iron, "M1" copper, "VT1"-Ti, electrolytic Ni and brass were investigated. During heating and rolling pressure in the vacuum did not go beyond 4×10^{-5} mm Hg. Rolling temperatures and reduction were adjusted to the properties of the metals and their interaction at elevated temperatures. Cohesion was determined by shear tests. In metals with a similar as well as dissimilar base but indefinitely soluble in the solid state, diffusion welding takes place providing a strong cohesion after a 15% reduction. Further deformation and higher

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ACCESSION NR: AP4037069

temperatures enhance cohesion strength. The maximum strength is determined by the structure of the intermediate layers that contain intermetallic phases ($TiCu_3$, Fe_2Ti, Zr_2Ni, etc.) and form directly adjacent to the contact surface as a result of interdiffusion. Orig. art. has: 3 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR(Physico-Technical Institute, AN SSSR)

SUBMITTED: 00 DATE ACQ: 05Jun64 ENCL: 00

SUB CODE: MM NO REF SOV: 001 OTHER: 001

Card 2/2

ACCESSION NR: AP4017354 S/0126/64/017/002/0223/0228

AUTHOR: Ul'yanov, R. A.; Tarasov, N. D.

TITLE: Some regularities in the changing properties of niobium-based alloys

SOURCE: Fizika metallov i metallovedeniye, v. 17, no. 2, 1964, 223-228

TOPIC TAGS: alloy, alloy hardness, alloy electrical resistance, niobium alloy, lattice parameter

ABSTRACT: Nb-based alloys with additions of Ta, W, Mo, Cr, Re, Pd, Ir, Ti, Zr, B, Si and La, prepared by arc fusion in argon, were examined for the lattice parameter (0-14% additions), hardness (0-10% additions), and electrical resistance (0.8% additions) at 20 and 200-1800C. The results show that the lattice parameter is greater for metals with greater atomic diameter, and the greater the difference between the atomic diameters of Nb and the alloying metal, the greater the change in the lattice parameter of the alloy. As shown in the Enclosure, the hardness and the specific electrical resistance follow a similar pattern. Cr, Zr, Pd, Re and Ti produced greater increases in resistance than other additions. "The chemical and spectrographic analyses of niobium and its alloys were carried out by Ye. M. Sayenko and I. G. Lyulicheva, respectively." Orig. art. has: 4 graphs.

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Card

ACCESSION NR: AP4017354

ASSOCIATION: Khar'kovskoye vy*ssheye komandno-inzhenérnoye uchilishche (Kar'kov Master Engineering Institute)

SUBMITTED: 01Apr63 DATE ACQ: 18Mar64 ENCL: 02

SUB CODE: ML NO REF SOV: 014 OTHER: 008

Card 2/2

ACCESSION NR: AP4017360 S/0126/64/017/002/0263/0268

AUTHORS: Kovtun, S. F.; Ul'yanov, R. A.

TITLE: The effect of alloying on thermal expansion of titanium

SOURCE: Fizika metallov i metallovedeniye, v. 17, no. 2, 1964, 263-268

TOPIC TAGS: titanium, titanium thermal expansion, titanium alloy, aluminum, molybdenum, chromium, rhenium, tantalum, lantharum, selenium, indium, bismuth, tellurium, palladium, phase transformation, reversible transformation, TGO titanium, vacuum dilatometer

ABSTRACT: Thermal expansion of Ti and its alloys was studied in order to find the materials that could be used as corrosion-preventing. on these metals at various temperatures. The studies were conducted in a vacuum dilatometer (1 x 10^{-5} mm Hg) with a measuring accuracy to 0.002 mm. The TGO titanium samples were melted in an arc furnace under argon and then remelted at least 5 times in order to obtain a more regular distribution of the alloying elements. To prevent the evaporation of the volatile components (Se, In, Bi, Te, La), the pressure in the furnace was increased. The ingots were rolled into rods 10 mm in diameter, and

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ACCESSION NR: AP4017360

the variation of the thermal expansion was measured in the temperature range between -196C (liquid nitrogen) and 1000C. It was established that the variation in the sample length can be expressed by the parabolic formula

$$l_t = l_0(1 + at + bt^2),$$

where: $a = 8.0 \times 10^{-6}$; $b \approx 2.7 \times 10^{-9}$. Alloying of Ti with Ta, Pd, and La produced insignificant changes in the mean coefficient of thermal expansion at 0-400C, alloying with Al and Cr caused it to increase, and alloying with Re lowered it substantially. The influence of the alloying elements on steel expansion was found to depend on the phase in which these elements occurred. The expansion of Ti was determined by the phase composition of the alloy. Some variations in the residual lengths of samples were observed after their cyclic heating and cooling. These variations were most pronounced in Ti and in Ti-Mo alloys. They may be explained by the gradual decomposition of the metastable β-phase in the cooling process and by the formation of the ω-phase. It was determined that the alloying elements (soluble in the α-phase) with thermal expansion coefficients smaller than that of Ti lowered the alloy coefficient of expansion, while those with higher coefficients increased the coefficient of expansion of the alloy.

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ACCESSION NR: AP4017360

Samples of Ti, Zn, and their alloys changed shape at temperatures above those of phase alteration. This is caused by the relaxation of stresses induced in the course of phase alteration. Orig. art. has: 5 graphs.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR (Physicotechnical Institute AN UkrSSR)

SUBMITTED: 03Mar63 DATE ACQ: 18Mar64 ENCL: 00

SUB CODE: MM NO REF SOV: 008 OTHER: 004

Card 3/3

S/0126/64/017/004/0505/0511

ACCESSION NR: AP4034048

AUTHORS: Ul'yanov, R. A.; Kovtun, S. F.

TITLE: Effect of alloying on electrical resistivity of titanium

SOURCE: Fizika metallov i metallovedeniye, v. 17, no. 4, 1964, 505-511

TOPIC TAGS: electric resistivity, titanium, aluminum, molybdenum, chromium, rhenium, palladium, tantalum, lanthanum, titanium iodide, commercial titanium

ABSTRACT: The results of an experimental study on the electrical resistivity changes arising from alloying titanium with aluminum, molybdenum, chromium, rhenium, palladium, tantalum, and lanthanum at temperatures from -196 to 1250C have been reported. Measurements at high temperatures were performed using a compensation method in vacuum with residual pressures not exceeding 10-5 mm Hg. Both 99.9% iodide titanium and commercial titanium were used. The resistivity ρ in both specimens indicates a polymorphic transformation at 882C. The values of ρ for the two titanium specimens do not differ more than 5% over the temperature range investigated. The microstructures of the various titanium-base alloys are given. A plot of alloy hardness and resistivity at 20C versus composition

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indicates that both values increase with alloying and that the increase is directly proportional to the difference in atomic diameters of the alloying element and titanium. The temperature dependence of the electrical resistivity in the binary alloys titanium-aluminum, molybdenum, chromium, and more complex Ti-Al-Cr-Mo alloys is presented graphically. The aluminum and molybdenum alloys raise the value of ρ in proportion to the alloy content throughout the measured temperature range. The 3% rhenium alloy shows a lower increase in ρ than the 1%-concentration specimen. Rhenium, as well as tantalum and palladium alloys of titanium, shows a decrease in the $\alpha \rightarrow \beta$ transformation temperature. Orig. art. has: 5 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR(Physicotechnical Institute AN UkrSSR)

SUBMITTED: 02Apr63 ATD PRESS: 3077 ENCL: 00

SUB CODE: MM, EM NO REF SOV: 010 OTHER: 006

L 19690-65 EPA(s)-2/EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/EPR/T/EWP(t)/EPA(bb)-2
EWP(b) Pe-4/Pt-10/Pu-4 ASD(f)-3/ASD(m)-3/IJP(c) JD/WW/JG
ACCESSION NR: AP5001243 S/0126/64/018/005/0740/0745

AUTHOR: Tarasov, N. D.; Ul'yanov, R. A.; Mikhaylov, Ye. D.

TITLE: Effect of alloying on the physical and mechanical properties of niobium

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 5, 1964, 740-745

TOPIC TAGS: niobium, niobium alloy, niobium alloy property, chromium containing alloy, rhenium containing alloy, zirconium containing alloy, titanium containing alloy, tungsten containing alloy, molybdenum containing alloy, iridium containing alloy, tantalum containing alloy, palladium containing alloy, silicon containing alloy

ABSTRACT: A study has been made of the effect of alloying on the properties of niobium. Three types of alloying elements were used: those which form a continuous series of solid solutions with niobium (W, Mo, and Ta) those which have a rather high, though limited, solubility in niobium (Ti, Re, Pd, Zr, Cr, and Ir), and active elements with a low solubility in niobium (B, Si, and La). It was found that

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L 19690-65
ACCESSION NR: AP5001243

there is a substantial difference in the effect of alloying elements (see Fig. 1. of the Enclosure). Such elements as Cr, Re, Mo, W, and Zr are especially beneficial since they increase the recrystallization temperature and, thereby, the creep resistance; in addition, Cr and Mo improve the oxidation resistance. Cr, Re, W, Mo, Ta, Ir, and Pd increase the modulus of elasticity at room and high temperatures; Ti decreases it somewhat. B, Si, and La increase strength and reduce ductility at room temperature. Boron has the most pronounced effect. At 1100C, none of the three has a pronounced effect on the strength, but all three increase ductility significantly. Orig. art. has: 1 table and 4 figures.

ASSOCIATION: Khar'kovskiy fiziko-tekhnicheskiy institut (Kharkov Physicotechnical Institute)

SUBMITTED: 20Nov63 ENCL: 01 SUB CODE: MM

NO REF SOV: 017 OTHER: 005 ATD PRESS: 3161

Card 2/3

KOVTUN, S.F.; UL'YANOV, R.A.

Device for measuring Young's modulus at low temperatures. Zav. lab. 30 no.11:1414 '64 (MIRA 18:1)

EWT(d)/EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) EM/JD/GD

L 36525-66

ACC NR: AT6012388 SOURCE CODE: UR/0000/65/000/000/0173/0179

AUTHORS: Ul'yanov, R. A.; Kovtun, S. F.

ORG: none

TITLE: The modulus of the elasticity of metals and titanium alloys

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 173-179

TOPIC TAGS: elasticity modulus, ~~metallurgy~~, titanium alloy, Young modulus, heat of fusion, thermal expansion, metallurgic research, crystal structure

ABSTRACT: Discussions on the role of the modulus of elasticity in metals and titanium alloys are developed. The relationship between the modulus of elasticity of a metal and the microstructure of the metal is reviewed: one definition of E is related to the electron structure of the metal; a second definition is E = W/V, where W is the work required to double the inter-atom distance and V is volume. Data for several metals are compiled for the purpose of indicating the variation of the temperature of fusion, the modulus of elasticity, the coefficient of thermal expansion, and the bonding energy in the crystal lattice of the metal. The physical occurrences within the crystal structure under heating are reviewed. Unit bonding energies of

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several metals are compared with respect to their effect on the coefficient of thermal expansion (see Fig. 1). The reasons for elements with a small atomic diameter having a larger modulus of elasticity than that of elements with larger atomic diameter are reviewed. The atomic diameter is also discussed in regard to its joint effect with temperature on the modulus of elasticity. The combination of elements in alloys can have varying effects on the modulus of elasticity, depending upon the hardness of the alloy, concentrations of elements, etc. The authors thank V. K. Grigorovich for his valued comments.

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ACC NR: AT6012388

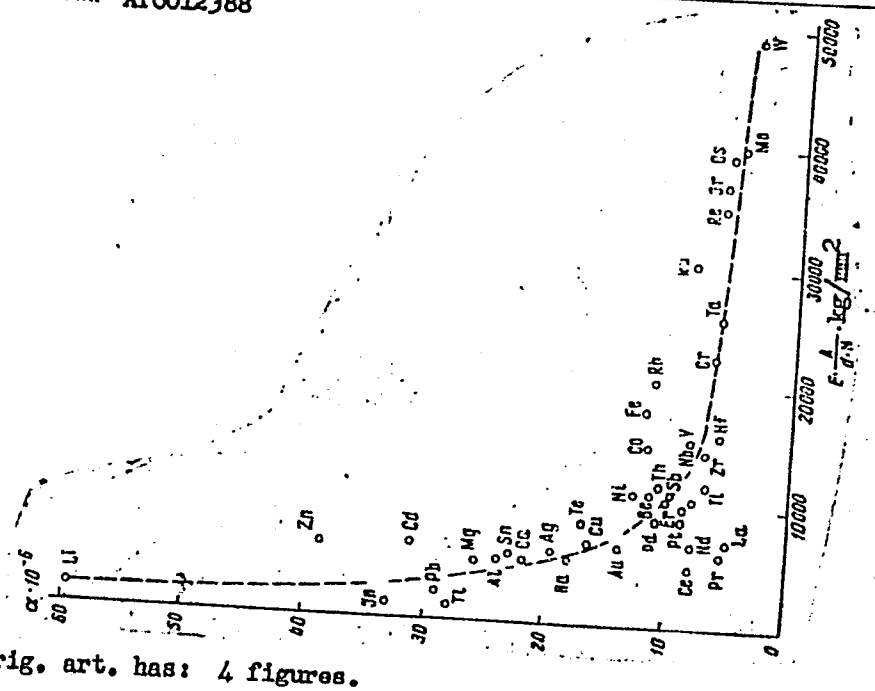

Fig. 1. Variation of the coefficient of thermal expansion of elements with the unit bonding energy in the crystal lattice.

Orig. art. has: 4 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 015/ OTH REF: 005

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L 30720-66 EWT(d)/EWT(m)/EWP(w)/I/EWP(t)/ETI IJP(c) JD/EM/JG/GD

ACC NR: AT6012389 SOURCE CODE: UR/0000/65/000/000/0180/0188

AUTHORS: Kovtun, S. F.; Ul'yanov, R. A.

ORG: none

TITLE: The effect of alloying on the modulus of elasticity, strength, and plasticity of titanium in the temperature interval from -196 to 800°

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 180-188

TOPIC TAGS: ~~elasticity~~, plasticity, titanium, titanium alloy, metal strength, elasticity modulus, molybdenum, aluminum, rhenium, chromium, palladium, lanthanum high strength alloy

ABSTRACT: The effect of alloying on the modulus of elasticity, the strength, and the plasticity of titanium in the temperature interval -196 to 800C is discussed. A description is given of the experimental apparatus used in testing. In this temperature range the alloying of titanium with aluminum, molybdenum, chromium, rhenium, and palladium causes a raising of the modulus of elasticity within the solubility limits of α-titanium. For concentrations of chromium, rhenium, molybdenum, and palladium exceeding the solubility in α-titanium, the modulus of elasticity of alloys at low temperatures is less than that for pure titanium, but with increasing temperatures the lowering of the modulus of elasticity is less pronounced. In particular it was

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L 36526-66

ACC NR: AT6012389

noted that the intensity of reduction of the modulus of elasticity with temperature is less in alloys which are simultaneously made up of aluminum, chromium, and molybdenum. Rhenium in concentrations up to 3% by weight increases the strength of alloys at room temperature and especially at high temperatures; however, under these conditions there is a sharp drop in plasticity. Palladium and tantalum in the concentrations investigated had an insignificant effect upon the strength and plasticity of titanium alloys. Alloying of lanthanum within the solubility limits of α-titanium has little effect on the elasticity and strength of the alloys, but increases their plasticity at low temperatures. The application of vacuum technology for inhibiting the contamination of metals by impurities makes possible high plasticity of titanium at low temperature. Orig. art. has: 5 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 015/ OTH REF: 005

Card 2/2 mlp

(N) L 11105-66 EWT(m)/EPF(n)-2/EWP(t)/EWP(b) IJP(c) JD/JG

ACC NR: AP6001107 SOURCE CODE: UR/0136/65/000/012/0079/0082

AUTHOR: Ul'yanov, R. A.; Kovtun, S. F.

ORG: none

TITLE: Vacuum cladding of titanium

SOURCE: Tsvetnyye metally, no. 12, 1965, 79-82

TOPIC TAGS: vacuum cladding, niobium, titanium, molybdenum, tantalum, tungsten

ABSTRACT: The feasibiltiy of cladding titanium with refractory metals such as Nb, Mo, Ta, and W has been investigated. Cladding was performed by pack rolling in a 10^{-5} mm Hg vacuum at 1100—1200C with reductions (in titanium) up to 60%. It was found that rolling alone produces no significant diffusion between titanium and niobium, molybdenum, or tantalum. A boundary between the cladding and titanium can be easily observed. Subsequent annealing, however, causes diffusion and increases the bond strength. With a reduction of 50%, the highest bond strength, 35 kg/mm^2, between titanium and tantalum was obtained. The bond strength between titanium and molybdenum or niobium was 25 kg/mm^2. No satisfactory bond was obtained between titanium and tungsten owing apparently to the insufficient ductility of tungsten at 1200C and the insufficient mutual solubility of these metals. Orig. art. has: 4 figures. [MD]

SUB CODE: 11 / SUBM DATE: none/ ORIG REF: 005/ ATD PRESS: 4176

Card 1/1 HW UDC: 669.295:621.771.8

L 30011-65 EWT(d)/EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/EPR/T/EWP(t),/EWP(b) Pe-4/Pu-4

ACCESSION NR: AP5006332 UR/0126/65/019/002/0263/0267

AUTHOR: [illegible]

TITLE: Effect of alloying on the temperature dependence of the elasticity modulus of titanium

SOURCE: Fizika metallov i metallovedenive, v. 19, no. 2, 1965, 263-267

TOPIC TAGS: titanium, titanium alloy, aluminum containg alloy, molybdenum containing alloy, chromium containing alloy, alloy elasticity modulus, titanium elasticity modulus, temperature dependence

ABSTRACT: A series of titanium alloys, containing small amounts of aluminum, chromium, molybdenum, titanium, tellurium, [illegible] lurium, and zirconium added singly or in combination, were melted in a non-[illegible]

[illegible] temperatures [illegible]

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L 30011-65
ACCESSION NR: AP5006332

[illegible] to substantially increase the ductility of Ti at low temperatures [illegible]

[illegible] in an amount of up to 3 wt.% [illegible] at 20K and 77K temperatures.
Orig. art. has: 3 figures.

ASSOCIATION: Fiziko-tekhnicheskiy [illegible] Physicotechnical Institute.

SUBMITTED: [illegible] ENCL: 00 SUB CODE: MM

Card 1/2

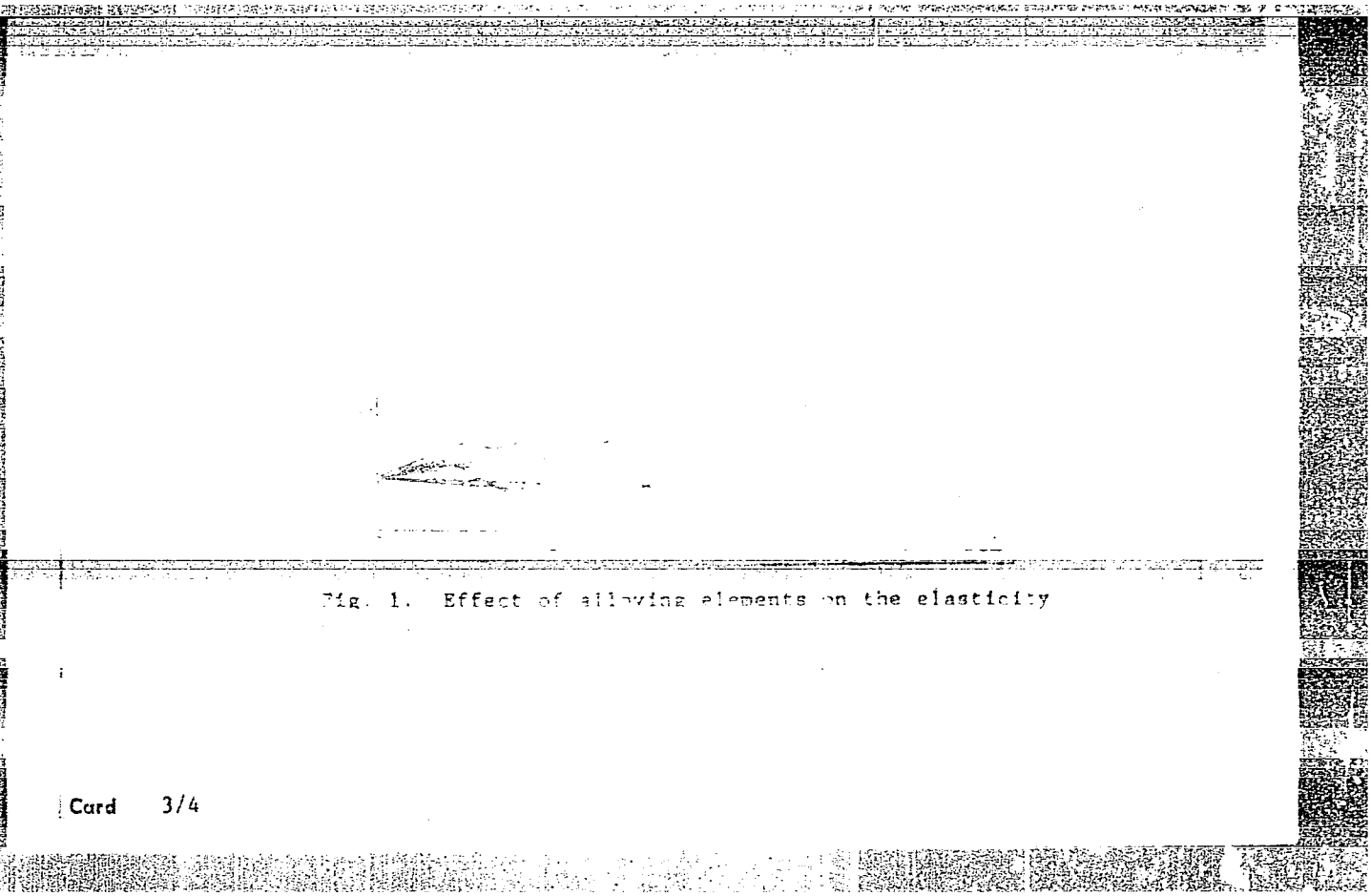

Fig. 1. Effect of alloying elements on the elasticity

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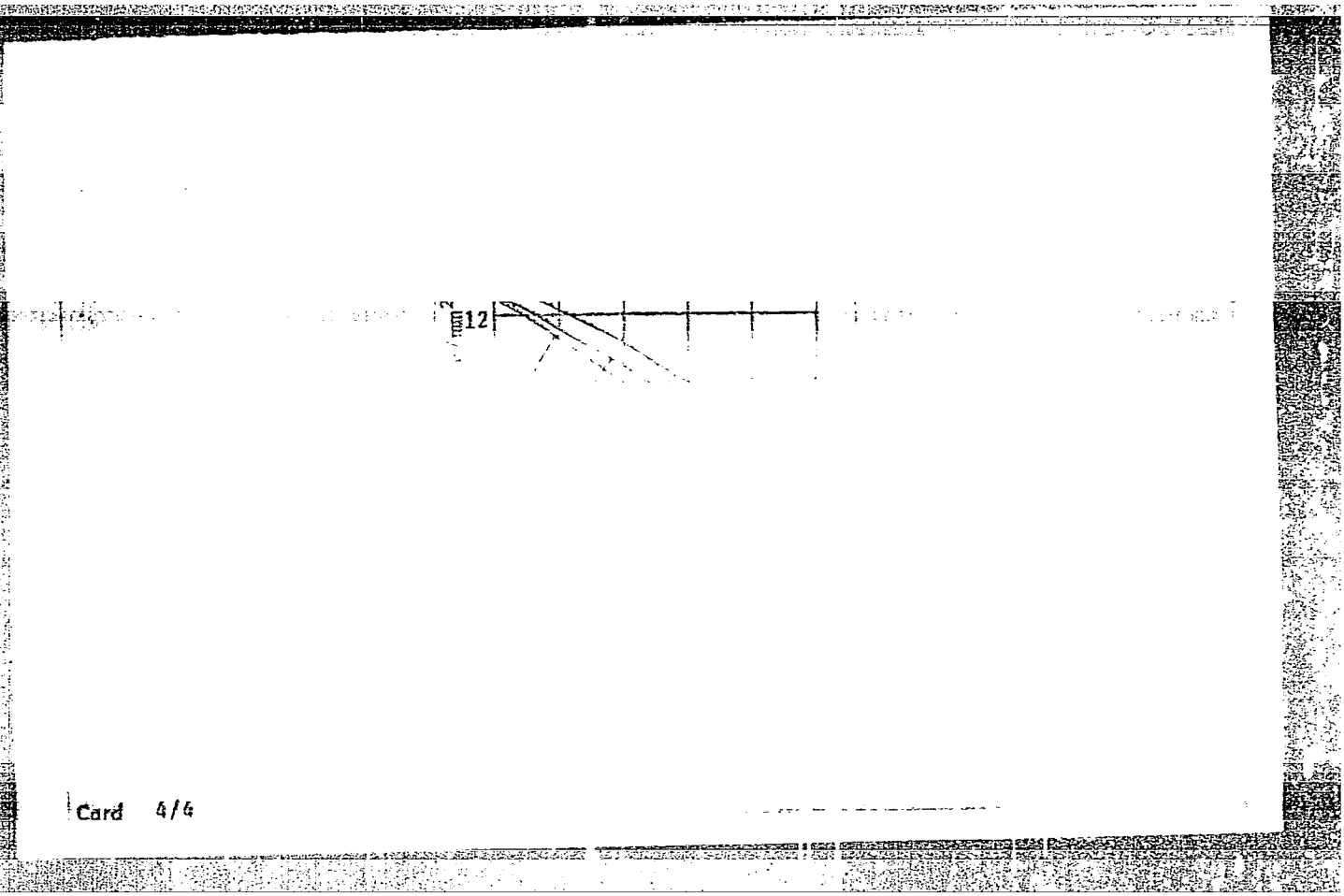

L 00999-67 EWT(m)/EWP(w)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6035955 SOURCE CODE: UR/0129/66/000/010/0048/0051

AUTHOR: Ul'yanov, R. A.; Moskalenko, V. A.

ORG: Institute of Low-Temperature Physics, AN UkrSSR (Fiziko-tekhnicheskiy institut nizkikh temperatur AN UkrSSR)

TITLE: Specific features of low temperature plastic deformation of titanium

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 10, 1966, 48-51 and insert facing p. 48

TOPIC TAGS: titanium, titanium plastic deformation, titanium alloy, titanium alloy plastic deformation, low temperature plastic deformation, subzero temperature deformation/AT-2 titanium alloy

ABSTRACT: The deformation of titanium and titanium alloys at low temperatures was investigated. It was found that as the test temperature decreases from +20C to -269C, the tensile and yield strength of VT1 commercial-grade titanium increases 2—2 1/2 times. With temperature decrease, elongation also increases, reaching a maximum at -196C and then dropping somewhat, but only to a level which is not below that of room temperature. Increased titanium ductility at low temperature is a result of twinning. The higher reductions in deformation cause a complete twinning and consequently, strengthening of polycrystalline materials. The same phenomena were observed in AT-2 titanium-base alloy, developed by Institute of Metallurgy, AN SSSR.

UDC: 669.295:536.43

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L 09999-67

ACC NR: AP6035955

This alloy is an α-solid solution of titanium with molybdenum, zirconium, vanadium, or niobium. At -269C, the tensile and yield strength of such alloys, vacuum annealed at 650—700C for 30 min, is 130 and 115 kg/mm^2 which is more than twice that at room temperature (55 and 48 kg/mm^2). The ductility of this alloy at -269C in some cases is higher than that at room temperature. The mechanism of plastic deformation of AT2 alloy is identical to that of commercial-grade titanium. The presence of β-phase in α + β alloys such as VT6 and VT14 has an adverse effect: it sharply reduces the twinning and impairs plastic deformation. These alloys have a very high strength at cryogenic temperatures (up to 220 kg/mm^2 at -253C), but elongation is only 2—3%. Titanium alloys of the α-type are the most suitable structural materials for cryogenic engineering.

SUB CODE: 13, 11/ SUBM DATE: none/ ORIG REF: 001/ OTH REF: 002/
ATD PRESS: 5105

Card 2/2

ACC NR: AP6035956 SOURCE CODE: UR/0129/66/000/010/0051/0054

AUTHOR: Il'ichev, V. Ya.; Ul'yanov, R. A.; Skibina, L. V.; Shpetnaya, A. A.

ORG: Physicotechnical Institute of Low Temperatures, AN UkrSSR (Fiziko-tekhnicheskiy institut nizkikh temperatur AN UkrSSR)

TITLE: Austenite stability of some Fe-Cr-Ni alloys at low-temperature deformation

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 10, 1966, 51-54

TOPIC TAGS: chromium nickel alloy, chromium nickel steel, austenite stability, martensitic transformation, ~~low temperature deformation~~ austenitic steel, chromium steel, nickel steel, metal deformation

ABSTRACT: The martensitic transformation in 18—9, 18—12 and 17—23 chromium-nickel austenitic steels differing in the stability of austenite has been studied. Steel specimens were heat treated to obtain a fully austenitic structure and then deformed at +20, -196, -253 and -269C. X-ray diffraction patterns revealed that no martensite forms in 18—8 and 18—12 type steels with deformation at +20C. At temperatures from -196 to -269C, the amount of the martensite formed is determined primarily by the degree of deformation. The martensitic transformation is suppressed by an increase in nickel content and, in 17—23 steel, austenite was found to be stable with deformation at all temperatures tested from +20 to -269C. Orig. art. has: 2 figures and 1 table.

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 004/ OTH REF: 005/

UDC: 536.48:669.15'24'26-194

Card 1/1

ACCESSION

Author:

mechanical properties of titanium

from

diameters and the chemical nature

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L 14717-65
ACCESSION NR: AT5048057

[illegible] greatly differing atomic diameter and chemical properties [illegible] particularly with Al. Re.

[illegible]

Card 2/3

L 14317-65
ACCESSION NR: AT4048057

structure of the intermediate layer; this was sufficiently strong, [illegible] in the Cu-Ti system. Orig. art. has: 14 figures.

ASSOCIATION: none

SUBMITTED: 15Jul64 ENCL: 00 SUB CODE: MM

NO REF SOV: 017 OTHER: 005

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23(5)

S/084/60/000/05/026/060
D047/D006

AUTHOR: Ul'yanov, S., Unit Navigator and Surveyor

TITLE: Photographic Plotting of Large-Scale Aeromagnetic Surveys: Advantages Proved by Practice

PERIODICAL: Grazhdanskaya aviatsiya, 1960, Nr 5, pp 18-19 (USSR)

ABSTRACT: The author recommends that photo-plotting should be done during aeromagnetic surveys to allow the navigator more time to note details of the route and reference points in the logbook. The advantages of photo-plotting were confirmed during the Yenisey aeromagnetic expedition. The navigator was able to do the survey without the flight operator.

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S/084/60/000/05/026/060
D047/D006

Photographic Plotting of Large-Scale Aeromagnetic Surveys: Advantages Proved by Practice

ASSOCIATION: Dal'nevostochnoye territorial'noye upravleniye GVF (Far East Territorial Directorate)

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UL'YANOV, S.A.

(Short circuits in electric systems)

Izd. 3., ?anovo perer. Moskva, Gos. energ. izd-vo, 1949 319 p (52-4043)

TK3226.U4 1949

1. Short circuits

Chilikin, M.G.; Sukomel, A.S.; Solov'yev, I.I.; Sirotinskiy, L.I.; Bel'kind, L.D.; Fedoseyev, A.M.; Grudinskiy, P.G.; UL'YANOV, S.A.; Venikov, V.A.; Medvedev, B.P.; Soldatkina, L.A.; Vasil'yev, A.A.; Rozanov, G.M.; Anisimova, N.D.

Professor A.A. Glazunov. On His 60th Birthday and 30th Year of Scientific Pedagogical, Engineering, and Society Actigity. Elektrichestvo, no. 1, 1952.

Monthly List of Russian Accessions. Library of Congress, April 1952. UNCLASSIFIED